Charlene Jensen

From: RMSeed6@aol.com

Sent: Monday, October 04, 2010 1:52 PM

To: joe.grindstaff@deltacouncil.ca.gov

Cc: phil.isenberg@deltacouncil.ca.gov; terry.macaulay@deltacouncil.ca.gov;

eric.nichol@deltacouncil.ca.gov; elaine.martin@deltacouncil.ca.gov; Charlene Jensen

Subject: Spragg Water Conduit

Dear Joe.

We did not have time to explicitly discuss Mr. Spragg's "waterbag" technology, and so I was planning to get back to you guys this week after you have cleared through the last Council Meeting and its aftermath.

So the timing is good here.

Mr. Spragg originally proposed his waterbag technology as a potential emergency measure for transporting fresh water across a seismically damaged Delta a number of years ago. My assessment was that although it was a novel and interesting idea, it would not be very useful at the full State level as the volume of water that could be delivered via towed waterbags was too small, and as it would face likely difficulties with regard to constrictions, obstacles and potential puncture threats during transit across a badly damaged Delta.

I was struck, however, by the greater potential represented by using the same type of fabric technology to construct a modular fabric "pipeline" through the Delta. As noted in the attached E-mail from Tawnley Pranger (Chief, Response and Security Section, Division of Flood Management, DWR) there is some significant potential promise here.

DWR has been largely discouraged/disallowed from considering novel ideas that might represent either back-up plans or interim options until we achieve a seismically secure "permanent" facility as the current Administration had decided instead to bank everything on a more narrowly focussed effort to garner permission (and eventually permits) to construct such a facility. Interim plans, and emergency back-up plans, were correctly viewed as having the potential to confuse and complicate that process. In that context, Mr. Pranger's response that the idea may have merit and that it might warrant study was admirably brave and frank. It is arguably disappointing that you and the Council had not been informed of this response. And perhaps others like it.

My view is that such a singular focus on the current effort to push through a secure transmission facility was an inadvisably risky approach, given (1) the unacceptably high current stakes, (2) the unacceptable likelihood that a seismic disaster will occur before such a secure transmission facility can be put in place (which will take at least ten years, even if we begin right away.... and with a roughly 1.5% chance each year of seismic disaster in the interim), and (3) the likelihood that construction of a secure transmission facility will continue to be further delayed anyway (by political and legal obstacles and challenges, etc.). History suggests that we will continue to live with unacceptably high exposure to an unprecedented water disaster for some time to come, and as we discussed it is my view that interim and emergency back-up plans should be considered, and that promising alternatives should be pursued with all possible vigor.

We discussed examples of steps that could be usefully taken to begin to prepare for emergency post-seismic repairs in order to accelerate the rate at which water deliveries could begin to be restored. Acceleration of those repairs would reduce the State-wide economic and social calamity associated with major seismic damage to the Delta, and would also reduce the risk that environmental laws would be over-ridden by executive orders (both State and Federal) and that potentially massive long-term environmental damages would be done in order to restore water deliveries as rapidly as possible.

The types of steps that we discussed are far different from the types of steps that would be taken to

improve our ability to perform the more routine "non-seismic" finite levee breach repairs that we are well used to dealing with; and no seismically useful steps of that sort have yet been taken. Coupled with the recent restrictions on water deliveries imposed over the past two years by Judge Wanger, which have served to draw down south-of-Delta "emergency" water storage reserves (despite a couple of decades of progress in increasing such emergency storage, highlighted by the construction of the Eastside Reservoir), we are currently as vulnerable as we have ever been to potential seismic disruption (for a period of multiple years) of the Deltacentric portions of our state's water supplies. It is my understanding that Judge Wanger's recent (and stunning) partial reversal of his own rulings in this regard are not so much premised on his having had a personal epiphany upon re-reading our eloquent Blue Ribbon Panel espousal of "co-equal" values; instead, they are a result of his having had the true level of vulnerability explained to him. A potential National Security issue.

Given the current level of risk, and the high stakes, interim and emergency response enhancement alternatives should be pursued. In addition to those types of alternatives that we did have time to discuss a bit, additional alternatives should be considered as well.

The "fabric pipeline" idea has potential merit here. The cost is low; apparently on the order of \$30 to \$40 million for a 6-foot diameter pipeline running fully across the Delta from a northern Sacramento River source to the Clifton Court Forebay. That would not be the entire cost, but instead only the cost of the fabric pipeline itself. Pumps would be needed at intake and to boost transmission, and a second set of pumps (at least) would be needed in the mid-Delta to pump up to the Clifton Court location (the Clifton Court pumps cannot "draw" the water by suction; "fabric" pipelines would require positive pressures and would simply collapse under any negative pressures or "suction"). So there would be additional costs for pumps, and also for intake and outflow connectivity details.

I am not an expert on fabric pipeline hydraulics, and do not know what types of circumferential stresses the fabric pipeline could safely sustain, and so I cannot estimate how much water such a line could transmit. But it would be a great deal more than zero, and in a time of emergency (and dire need), that could be a Godsend. (The fabric tubes would be largely submerged in Delta waters, and that would serve to provide an external buttressing force, and to reduce circumferential stresses; increasing capacities.) And there is no obvious reason why we would use only one such fabric pipeline. If the systems works, multiple fabric pipelines could be installed; they are a "modular" potential measure.

In the event of a seismic water catastrophe in the Delta, the costs associated with such a system will not be an issue. We will expend literally billions of dollars to rapidly expedite eventual "permanent" repairs, and we will simultaneously sustain far higher economic losses and social disruption due to lack of water deliveries until that is achieved. The economics that currently prevail under "ordinary" circumstances" will not be applicable; and massive Federal resources will be brought to bear.

The fabric pipelines may be a potentially feasible emergency measure to partially mitigate the current potential for a seismically induced water disaster. Apparent advantages might include:

- 1. Relatively low cost.
- 2. The apparently environmentally benign nature of the system (as compared to massive dredging, etc., and potential semi-permanent rearrangement of channels and flow to otherwise expedite "regular" levee repairs and reconstruction.)
 - 3. The rapidity with which the system could be deployed.
- 4. The modular nature of the system, so that it can be progressively expanded (additional pipelines added) over the initial months after an earthquake.
- 5. The system itself would appear to be rapidly repairable, and so could be maintained in a resilient manner for several years in the face of urgent levee repair and reconstruction efforts.

"Potentially feasible" is an important phrase, however. This is a novel proposal, and it would need to be studied, and field tested.

I understand that the Delta Council is not funded to undertake such development work. But the Council is empowered to recommend that interim and emergency response alternatives be considered, and that promising alternatives be advanced by means of study and proof-testing (e.g. by DWR, or others.) Also that suitable investments be made (in conjunction with development of realistic post-seismic emergency response plans) in promising/viable measures.

Given its attributes, the "fabric pipeline" idea appears to warrant inclusion among potential alternatives to be considered. The fabric pipelines themselves could apparently be rapidly fabricated and deployed, but the same may not be true with regard to pumps and intake and outfall features. If fabric pipelines were to be a potentially feasible part of our arsenal of response tools, then (1) the system would have to have been prooftested, (2) intake and outfall preparations might have to be emplaced, and (3) working pumps might have to be acquired and tested in advance of the disaster.

Given that the current levels of risk are so high, and that the prospects for a rapid implementation of a secure long-term solution (e.g. a more "permanent" seismically secure facility) are both uncertain and remote with respect to even best-case timing; undertaking expeditious efforts to evaluate and implement "interim and emergency response enhancement" alternative should have the highest possible priority.

I hope this answers your questions. If you wish to discuss this further, I can usually best be reached either at this E-mail address, or on my cell phone at (925) 899-6101.

Best regards,

Ray Seed

From: Pranger, Tawnly [mailto:redwood@water.ca.gov]

Sent: Wednesday, January 13, 2010 5:20 PM

To: Terry Spragg **Cc:** Mierzwa, Michael

Subject: RE: Waterbag technology

Mr. Spragg,

Below are my thoughts regarding your proposal for the establishment of a fabric pipeline for emergency water supply through the Delta.

The idea has merit and could be tested for viability, but I would recommend addressing the following issues prior to investing such time and effort:

- What environmental impacts may occur?
 - O What would be the impact of reducing channel capacity and reducing fresh water to the salinity and how much would it extend the time for recovery?
- Once the pipeline crosses to the San Joaquin River, it is effectively travelling upstream. The draw from the pumping plants may not be sufficient to affect the water in the fabric pipe and may need to be supplemented with additional pumping support.
- What would be the effect of potentially blocking of navigable waterways for long periods of time?
 - o Would this blockage be allowed?
 - o How would it impact other emergency response activities (barge traffic, etc)?
- How does this solution compare to other proposed solutions that provide reduced risk to flood hazards in addition to water supply?

One additional thought for your consideration. If the idea is found to be viable, the proposed solution is not dependent on a rapid response to the changing conditions of the Delta, and that it could be implemented within the 6-month window after an event without the need for pre-staging materials, and I would find it difficult to justify acquiring the material prior to the event when considering the reported lifespan of the material (20 years stored – 3 years in place) and the frequency of the intended event (estimated return period of over 150 years).

Tawnly Pranger, PE Chief, Response and Security Section Division of Flood Management Department of Water Resources (916) 574-2793